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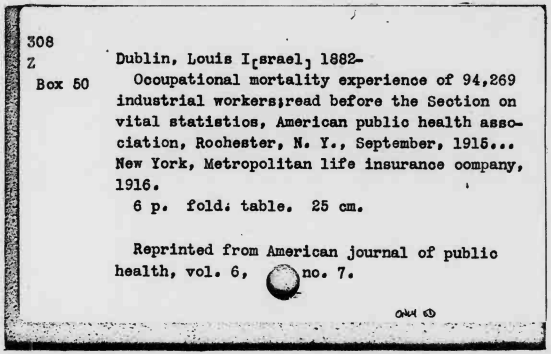

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Occupational Mortality Experience of 94,269 Industrial Workers

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Read before the Section on Vital Statistics,
AMERICAN PUBLIC HEALTH ASSOCIATION,
Rochester, N. Y., September, 1915

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BY
LOUIS I. DUBLIN, PH.D., Statistician
Metropolitan Life Insurance Company, New York
1916

OCCUPATIONAL MORTALITY EXPERIENCE OF 94,269 INDUSTRIAL WORKERS.

METROPOLITAN LIFE INSURANCE COMPANY EXPERIENCE, 1911–13.

A Preliminary Report Read before the Section on Vital Statistics, American Public Health Association, Rochester, N. Y., September, 1915.

LOUIS I. DUBLIN, PH.D.,
Statistician, Metropolitan Life Insurance Company, N. Y.

IT IS the purpose of this paper to present the preliminary results of an analysis of 94,269 death records of occupied white males, ages 15 and over, with especial reference to the influence of occupation upon the causes of death. The material is from the Industrial Mortality Experience of the Metropolitan Life Insurance Company and covers the three years 1911, 1912, and 1913. The occupations represented in this experience are almost entirely industrial in character. Table I shows that "laborers" form the largest group of decedents, with 11.4 per cent. of the total. All the more important occupations in the various industries are represented. There are large numbers of clerical employees, farmers, and farm laborers, workers in the building trades, in the iron and steel mills, and in the railway service.

A few words as to method may be of interest. The occupations returned upon the death certificates were classified according to a list of titles abridged and modified from the one prepared by the Census Bureau for use in occupational mortality tabulations. Attention was especially directed to those occupations which were represented in large numbers or which possessed exceptional interest from the viewpoint of hazard. The causes of death selected for the study were likewise those which were of the greatest interest because of their numerical importance or because they indicated the character of the hazard in the occupation. The number of deaths from these causes was then tabulated for each occupation by 10-year age periods. Table II presents the general characteristics of the material for all occupied white males combined. The remaining table (III, Parts a–n), is for individual occupations.

It were well if in addition to these tabulations there were available corresponding figures for the living policyholders by occupation and age. We would then have been able to present the death-rates occurring in the various occupations by age period and by causes of death. Unfortunately, this is not possible because of the great cost involved in keeping records in such detail for over ten million industrial policyholders. We may, nevertheless, determine the significant

TABLE I.

OCCUPATIONS OF WHITE MALE DECEDENTS—AGES 15 AND OVER. METROPOLITAN LIFE INSURANCE COMPANY—INDUSTRIAL DEPARTMENT. MORTALITY EXPERIENCE, 1911-13.

Occupation	No. of Deaths.	Per Cent. of Total.
All Occupations (excluding "Retired")	94,269	100.0
Laborers (undefined)	10,748	11.4
Teamsters, Drivers and Chauffeurs	6,471	6.9
Clerks, Bookkeepers and Office Assistants	4,139	4.4
Carpenters	3,917	4.2
Farmers and Farm Laborers	3,800	4.1
Machinists	3,152	3.3
Painters, Paper-hangers and Varnishers	2,722	2.9
Policemen, Watchmen and Guards	2,407	2.6
Store Clerks and Salesmen	2,396	2.5
Textile Mill Workers	2,390	2.5
Merchants and Storekeepers	2,260	2.4
Saloon-keepers and Bartenders	2,190	2.3
Railway Track and Yard Workers	1,932	2.0
Janitors and Building Employees	1,770	1.9
Masons and Bricklayers	1,748	1.9
Iron Moulders	1,646	1.7
Coal Miners	1,557	1.7
Shoemakers	1,452	1.5
Stationary Engineers and Firemen	1,443	1.5
Children, Students and Scholars	1,437	1.5
Blacksmiths	1,273	1.4
Professional Service	1,186	1.3
Agents and Canvassers	1,183	1.3
Plumbers, Gas Fitters and Steam Fitters	1,153	1.2
Tailors and Garment Workers	1,095	1.2
Compositors and Printers	1,056	1.1
Railway Enginemen and Trainmen	947	1.0
Street Railway Employees	868	.9
Hostlers and Stablemen	832	.9
Hucksters and Peddlers	829	.9
Sailors and Marine Workers	787	.8
Iron and Steel Mill Workers	762	.8
Waiters	758	.8
Cabinet and Furniture Makers	757	.8
Cigar Makers and Tobacco Workers	693	.7
Leather Goods Workers	662	.7
Bakers	654	.7
Longshoremen and Stevedores	651	.7
Tinners and Tinware Workers	614	.7
Street and Sewer Cleaners	609	.6
Electricians	596	.6
Barbers	582	.6
Coopers	521	.6
All Other Occupations	15,534	16.5

TABLE II.

NUMBER OF DEATHS FROM PRINCIPAL CAUSES AND PER CENT. EACH CAUSE OF ALL CAUSES IN ALL OCCUPATIONS (EXCLUDING "RETIRED")—BY AGE PERIODS OVER FIFTEEN YEARS—WHITE MALES.

METROPOLITAN LIFE INSURANCE COMPANY—INDUSTRIAL DEPARTMENT—MORTALITY EXPERIENCE, 1911-1913.

Cause of Death.	International List No.	Ages 15 and over.		Ages 15-24.		Ages 25-34.		Ages 35-44.		Ages 45-54.		Ages 55-64.		Ages 65 and over.		Av. Age at Death.
		No. of Dths.	*Per cent.	No. of Dths.	Per cent.	No. of Dths.	Per cent.	No. of Dths.	Per cent.	No. of Dths.	Per cent.	No. of Dths.	Per cent.	No. of Dths.	Per cent.	
All causes		94,269	100.0	11,116	100.0	12,953	100.0	15,242	100.0	16,096	100.0	19,135	100.0	19,127	100.0	47.9
Typhoid fever	1	1,390	1.5	581	5.2	356	2.7	211	1.4	128	.8	81	.4	33	.2	31.1
Influenza	10	709	.8	64	.6	65	.5	94	.6	113	.7	189	1.0	244	1.3	53.3
Tuberculosis of the lungs	25, 29	19,349	20.5	3,735	33.8	5,262	40.9	5,017	32.9	3,084	18.5	1,640	8.6	503	2.9	37.1
Cancer (all forms)	39-45	4,378	4.9	76	.7	103	.8	357	2.3	989	5.9	1,665	8.7	1,388	7.3	57.8
Acute articular rheumatism	47	960	1.0	105	.9	61	.4	73	.5	70	.4	51	.3	99	.5	41.1
Chronic rheumatism and gout	48	69	.1	4	.....	6	.....	9	.1	10	.1	20	.1	20	.1	54.9
Diabetes	50	913	1.0	110	1.0	92	.7	100	.7	171	1.0	249	1.3	191	1.0	49.7
Alcoholism	56	888	.9	21	.2	182	1.4	314	2.1	227	1.4	106	.6	39	.2	43.1
Chronic lead poisoning	57	81	.1	3	.....	8	.1	24	.2	24	.1	14	.1	8	.....	47.5
Other occupational and chronic poisonings	58, 59	31	.....	4	.....	4	.....	7	.....	7	.....	4	.....	4	.....	45.8
Cerebral hemorrhage, apoplexy and paralysis	64, 65	5,283	.6	82	.7	160	1.2	359	2.3	867	5.2	1,844	9.6	2,554	13.4	63.0
Organic disease of the heart	79	11,323	12.0	640	5.8	697	5.4	1,181	7.7	1,850	11.1	3,048	15.9	3,907	20.4	55.6
Acute and chronic bronchitis	80-90	804	.9	30	.3	36	.3	52	.3	103	.6	213	1.1	370	1.9	59.9
Pneumonia (lobar and undefined)	92	6,776	7.2	599	5.4	952	7.3	1,228	8.1	1,369	8.2	1,431	7.5	1,197	6.3	48.1
Pleurisy	93	276	.3	46	.4	30	.2	40	.3	59	.4	55	.3	46	.2	46.1
Cirrhosis of the liver	113	2,136	2.3	22	.2	154	1.2	389	2.6	635	3.8	593	3.1	343	1.8	52.0
Bright's disease	119-123	9,160	9.8	276	2.5	577	4.5	1,100	7.2	1,553	9.7	2,153	11.3	2,501	13.1	53.1
Suicide (all forms)	155-163	2,749	2.9	308	2.8	402	3.1	496	2.9	428	2.6	383	2.0	193	1.0	43.1
	165-181	2,120	2.3	2,130	19.2	1,616	12.5	1,516	9.9	1,419	8.5	1,236	6.5	835	4.4	39.3
Accidental violence	165-186	8,752	9.3													
All other causes of death		18,719	19.9	2,292	20.6	2,175	16.8	2,678	17.5	3,290	19.7	3,759	19.6	4,525	23.9	.....

* Percentage, deaths from specified causes, of deaths from all causes in age period.

facts in the relation between occupations and causes of death by the method of proportionate mortality, that is, by comparing the per cent. of total deaths from any one cause in a given age period and in a specified occupation with the corresponding figure for all occupied persons. For example, at the age period 25 to 34, 28.7 per cent. of the deaths among blacksmiths were due to tuberculosis of the lungs (see Table III, a*). For the same age period, the corresponding proportion of deaths from tuberculosis of the lungs among all occupied males was 40.9 per cent (Table II). The ratio of these two percentages may be conveniently called the index of mortality for the specified cause. In this instance the index of mortality for tuberculosis of the lungs among blacksmiths in the age period 25 to 34 is 70.2 per cent. It is quite evident, therefore, that pulmonary tuberculosis among blacksmiths at the age period 25 to 34 does not require the same relative attention from hygienists as it does in certain other occupations.

The fuller paper will take up in this manner each of the occupations and consider the causes of death which present the greatest variations from the standard of "all occupations." In this paper we shall refer only to a few of the more interesting considerations which arise out of the study. Thus we find that pulmonary tuberculosis was the most represented cause of death in ten out of the fourteen occupations referred to in these tables. It was found most common among clerks, bookkeepers, and office assistants (Table III, c) where it was responsible for 35 per cent. of all the deaths. In the age period 25 to 34, 51.2 per cent. of all the deaths were from this disease, whereas, among all occupied males in this age period, only 40.9 per cent. of the deaths were from pulmonary tuberculosis. The index of tuberculosis mortality among clerks, bookkeepers, and office assistants is, therefore, 125, the index for this disease was also found high among compositors and printers (Table III, e) and among teamsters, drivers, and chauffeurs (Table III, m). It was found least represented among coal miners (Table III, d), where it was responsible for only 5.8 per cent. of all the deaths. In the age period 25 to 34 we find only 11.9 per cent. of all the deaths due to this disease. The index of tuberculosis mortality, therefore, is 29 per cent. This low index is characteristic of the disease among coal miners at all age periods up to 65. It might appear that the low proportionate mortality from pulmonary tuberculosis among coal miners is the result of the high proportion of deaths from other causes, notably accidental violence. Yet other respiratory diseases such as pneumonia and acute and chronic bronchitis are even more prevalent among coal miners than among all occupied males. A fairly large proportion of tuberculosis is found among railway employees, who suffer from a higher proportion of accidents than do the coal miners. A high percentage from accidents is, therefore, not incompatible with a fairly normal proportionate mortality from pulmonary tuberculosis. Coal miners seem to

*Owing to limitations of space, it has been considered inadvisable to print the tables for individual occupations in full; only those causes of death are given to which reference is made in the text.

TABLE III.

NUMBER OF DEATHS FROM PRINCIPAL CAUSES AND PER CENT. EACH CAUSE OF ALL CAUSES, IN FOURTEEN OCCUPATIONS BY AGE PERIOD OVER FIFTEEN YEARS—WHITE MALES.

METROPOLITAN LIFE INSURANCE COMPANY—INDUSTRIAL DEPARTMENT—MORTALITY EXPERIENCE, 1911–1913.

Part	Occupation.	Cause of Death.	Age Period.								Average Age at Death.
			15 and over.		15–24.	25–34.	35–44.	45–54.	55–64.	65 and over.	
			No. of Deaths.	*Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	
a	Blacksmiths	All causes	1,273	†(1,273)	(47)	(87)	(165)	(235)	(337)	(402)	55.4
				100.0	100.0	100.0	100.0	100.0	100.0	100.0	
		Tuberculosis of the lungs	178	14.0	29.8	28.7	35.8	17.0	8.3	3.0	43.9
b	Cigar Makers and Tobacco Workers	All causes	693	(693)	(66)	(98)	(95)	(121)	(158)	(155)	49.5
				100.0	100.0	100.0	100.0	100.0	100.0	100.0	
		Tuberculosis of the lungs	167	24.1	48.5	44.9	41.1	25.6	11.4	1.9	37.9
		Suicide (all forms)	22	3.2	3.0	2.0	4.2	3.3	3.8	2.6	49.3
c	Clerks, Bookkeepers and Office Assistants	All causes	4,139	(4,139)	(1,307)	(893)	(695)	(518)	(431)	(295)	36.5
				100.0	100.0	100.0	100.0	100.0	100.0	100.0	
		Tuberculosis of the lungs	1,449	35.0	46.3	51.2	33.4	21.6	8.8	1.7	29.4
d	Coal Miners	All causes	1,557	(1,557)	(151)	(135)	(182)	(319)	(407)	(363)	51.3
				100.0	100.0	100.0	100.0	100.0	100.0	100.0	
		Tuberculosis of the lungs	91	5.8	4.0	11.9	12.1	6.6	3.4	3.3	45.8
		Acute and chronic bronchitis	49	3.1	....	.....	1.1	1.6	4.2	6.9	63.6
		Pneumonia (lobar and undefined)	161	10.3	4.6	7.4	10.4	14.7	11.3	8.8	53.1
		Suicide (all forms)	18	1.2	.7	2.2	2.2	2.2	.7	....	44.6
		Accidental violence	317	20.3	62.9	43.7	30.7	15.7	10.3	4.1	36.6
e	Compositors and Printers	All causes	1,056	(1,056)	(217)	(221)	(225)	(176)	(120)	(97)	40.2
				100.0	100.0	100.0	100.0	100.0	100.0	100.0	
		Tuberculosis of the lungs	360	34.1	45.2	49.8	39.1	23.9	15.8	3.1	33.5
f	Farmers and Farm Laborers	All causes	3,890	(3,890)	(239)	(198)	(266)	(431)	(1,008)	(1,748)	58.5
				100.0	100.0	100.0	100.0	100.0	100.0	100.0	
		Organic diseases of the heart	641	16.5	5.8	3.5	6.8	13.7	18.5	20.4	63.6
g	Laborers	All causes	10,748	(10,748)	(622)	(1,026)	(1,453)	(2,049)	(2,732)	(2,866)	52.8
				100.0	100.0	100.0	100.0	100.0	100.0	100.0	
		Suicide (all forms)	186	1.7	4.8	2.9	2.1	1.5	1.7	.7	44.9
h	Machinists	All causes	3,152	(3,152)	(573)	(565)	(500)	(509)	(516)	(489)	43.9
				100.0	100.0	100.0	100.0	100.0	100.0	100.0	
		Suicide (all forms)	81	2.6	1.6	3.5	3.2	3.3	1.4	2.5	43.8
i	Painters, Paperhangers and Varnishers	All causes	2,722	(2,722)	(166)	(368)	(552)	(592)	(592)	(452)	48.6
				100.0	100.0	100.0	100.0	100.0	100.0	100.0	
		Chronic lead poisoning	54	2.0	.6	1.1	3.4	2.5	1.9	.9	47.7
j	Railway Enginemen and Trainmen	All causes	947	†(947)	(203)	(300)	(173)	(109)	(94)	(68)	37.4
				100.0	100.0	100.0	100.0	100.0	100.0	100.0	
		Tuberculosis of the lungs	133	14.0	11.8	14.7	24.9	13.8	7.4	....	34.8
		Organic diseases of the heart	51	5.4	1.0	1.3	5.2	10.1	13.8	17.6	52.2
		Suicide (all forms)	23	2.4	2.5	2.3	2.9	2.8	2.1	1.5	36.7
		Accidental violence	401	42.4	66.5	57.7	30.0	18.3	17.1	7.4	30.1
k	Railway, Track and Yard Workers	All causes	1,932	(1,932)	(177)	(243)	(232)	(334)	(475)	(471)	50.7
				100.0	100.0	100.0	100.0	100.0	100.0	100.0	
		Accidental violence	402	20.8	43.5	34.6	32.3	19.5	13.0	8.3	41.4
l	Saloon-Keepers and Bartenders	All causes	2,190	(2,190)	(57)	(492)	(775)	(535)	(243)	(88)	42.6
				100.0	100.0	100.0	100.0	100.0	100.0	100.0	
		Alcoholism	75	3.4	3.5	4.7	4.5	2.2	1.2	....	38.8
		Cirrhosis of the liver	165	7.5	....	4.5	8.3	10.7	6.6	6.8	44.4
		Bright's disease	267	12.2	3.5	6.3	10.7	17.4	18.5	15.9	46.8
		Suicide (all forms)	60	2.7	3.5	3.9	2.3	1.9	3.7	2.3	41.2
m	Teamsters, Drivers and Chauffeurs	All causes	6,471	(6,471)	(768)	(1,498)	(1,579)	(1,152)	(818)	(656)	42.2
				100.0	100.0	100.0	100.0	100.0	100.0	100.0	
		Tuberculosis of the lungs	1,825	28.2	36.6	42.7	35.7	20.2	10.0	4.0	35.5
n	Textile Mill Workers	All causes	2,390	(2,390)	(383)	(282)	(310)	(399)	(495)	(521)	47.6
				100.0	100.0	100.0	100.0	100.0	100.0	100.0	
		Suicide (all forms)	43	1.8	2.3	1.4	1.0	3.5	1.4	1.2	45.4

* Per cent. deaths from specified causes, of deaths from all causes in age period.

† Superposed figures denote total deaths, all causes, in specified age period.

enjoy a very definite immunity from pulmonary tuberculosis. Future medical research, in determining just what the protective factor in the environment of the coal miner is, will make an advance that will be of great practical value.

Organic disease of the heart ranks next in importance in our investigation. It is responsible for 12 per cent. of all deaths in all age periods combined. Unlike tuberculosis, which is most prevalent at the younger ages, this disease reaches its highest point in the advanced age periods, namely, 65 and over, where 20.4 per cent. of all deaths are due to it. It is also the leading cause of death in the age period 55 to 64. It is found most prevalent among farmers and farm laborers (Table III, f), among whom it was responsible for one death out of every six. This is not an indication of poor health conditions among farmers, however, for farmers live to a ripe old age, and organic disease of the heart is, as we have shown, primarily a disease of the older ages. This disease is found least represented among railway enginemen and trainmen. Inferences must not be drawn too readily from the relative proportion of heart disease in various occupations, since it is one of the more unsatisfactory returns of cause of death found on certificates, obscuring in many instances more definite conditions which autopsy could determine.

Alcoholism is one of the minor causes of death in our tabulation; yet it is so significant socially that reference will be made to it. It was responsible for only .9 per cent. of all the deaths among all occupied males. This figure is clearly an understatement, because deaths which are due to alcoholism are often assigned to its major effects. Thus we find that those occupations which are most subject to alcoholism show also a higher rate from Bright's disease and cirrhosis of the liver. Alcoholism is found most prevalent among saloon-keepers and bartenders (Table III, l). Among them it was responsible for 3.4 per cent. of the total deaths. In the age period 25 to 34, it caused 4.7 per cent. of all deaths and, in the age period 35 to 44, 4.5 per cent. If we add to this the proportionate mortality from cirrhosis of the liver and Bright's disease we obtain 23.5 per cent. of all the deaths. Among all occupied males, on the other hand, these three diseases in the age period 35 to 44 are responsible for only 12.5 per cent. of all the deaths. The unfavorable effect of occupation is, therefore, quite clear in the case of saloon-keepers.

A strong positive correlation, in all probability, exists between the incidence of alcoholism and that of suicide. This latter cause was responsible in our investigation for 2.3 per cent. of all the deaths at all ages (Table II). The proportion varies somewhat in the various age periods, but is greatest at ages 25 to 34. It is most prevalent among cigar makers (Table III, b), saloon-keepers and bartenders (Table III, l), machinists (Table III, h) and railway enginemen and trainmen (Table III, j); in other words, among occupations where the wear and tear on the nervous system is greatest. Its importance as a cause of death is least noted among coal miners (Table III,d), laborers (Table III, g) and textile mill

workers (Table III, n). Recent investigators have urged that suicide is a form of insanity. On this basis, it would appear that the high incidence of suicide among saloon-keepers and bartenders may be in part the result of the insanity induced by alcoholism. This opens up a fertile field of investigation for both the statistician and the psychiatrist.

Accidental violence is found to be most prevalent among enginemen and trainmen (Table III, j), coal miners (Table III, d) and railway, track, and yard workers (Table III, k). It is most highly represented at the younger ages in all these occupations. Thus, among railway enginemen and trainmen, the index of mortality for accidental violence in the age period 25 to 34 is 461.6; in the age period 55 to 64 this index is reduced to 263.1. These indices, when compared with similar figures for European mortality experiences, show how inadequate American methods of accident prevention still are.

Occupational diseases are represented in small numbers. Lead poisoning is found significant among painters, paper hangers, and varnishers (Table III, i). In this occupational group 2 per cent. of all the deaths occurring were due to chronic lead poisoning, and in the age period 35 to 44 this proportion rose to 3.4 per cent. Other occupational diseases are so rarely recorded as not to warrant any special mention.

In this preliminary statement I have been able to review only a few of the more important causes of death, as represented in a small number of occupations. Sufficient has been said, however, to show that this method of investigation is a profitable one for furthering industrial hygiene. I would therefore suggest that health officers of states and cities take note of the recommendations made last year by the Committee on Occupational Mortality of this Section on Vital Statistics, American Public Health Association, and that they attempt to analyze and report their mortality returns by occupation, cause of death, and age period. Local communities often have certain hazardous occupations largely developed in their midst, and enjoy splendid opportunities for the intensive investigation of the effects of occupation upon the life and health of the worker. They can, at small expense, determine the number of workers in any particular industry, their age, their occupational environment, the character of the illnesses which are treated by the local physicians, the evidence of physical deterioration during service, and finally the mortality as shown by the death certificates which they receive. Such local reports prepared over a series of years would extend the findings of the Census Bureau and of life insurance companies, and would often have enormously important practical results in improving the hygienic conditions of the industry studied. It is also hoped that this Section will again take active steps in urging the Federal Government to bring to a successful conclusion the investigation of occupational mortality begun by the Census Bureau in connection with the returns for the year 1910.

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